

# BASICS OF THE RENESAS SYNERGY™ PLATFORM

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# CHAPTER 4

## GETTING THE RENESAS SYNERGY™ PLATFORM TOOLCHAIN UP AND RUNNING

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## 4 GETTING THE RENESAS SYNERGY™ PLATFORM TOOLCHAIN UP AND RUNNING

### What you will learn in this chapter:

- Where to get and how to install the toolchain(s) for the Synergy Platform.
- Steps to be performed during the first startup of the Integrated Solutions Development Environment (ISDE).

In this chapter we will download and install the tools necessary to work on software projects for the Synergy Platform. You have the choice between two different toolchains: The e<sup>2</sup> studio ISDE with the Synergy Software Package (SSP) or the IAR Embedded Workbench® for Renesas Synergy™ (IAR EW for Synergy) together with the Synergy Standalone Configurator (SSC) and the SSP.

The following paragraphs will outline all the steps necessary and you will find that the installation of both toolchains is free of any hassle as the installers will take care of everything needed, once you made your selections on what and where to install. After the installation is done we will perform a short sanity check to ensure that the installation is working.

### 4.1 Introduction to the Synergy Solutions Gallery

First step of the installation process is to go to the Synergy Solutions Gallery on the web at <https://www.renesas.com/eu/en/products/synergy/gallery.html>, which is the convenient single point of access to everything needed for the development of a Synergy application: Development environments, compilers, tools, documentation and support. The complete ecosystem is there at your fingertips. And not only from Renesas, but also from Express Logic, IAR Systems® and all partner companies.

To download any of the tools it is necessary to register as a user. Registration is straightforward with only a few questions to be answered before access to the site is granted. To register, simply click on *Sign in* at the very top of the page. This will get you to the *My Renesas* login page, where you can also register by clicking on the orange *Register now!* button at the bottom of the page. Follow the steps and you are all set. If your company is already registered, you might want to ask your Company Super User to add you to the company's user database as well.

Once registered, a simple log-in will be enough to browse the site and to download most software packages immediately. And just in case, you have a question the web site doesn't answer, there are plenty of options to contact Renesas for help.

One possibility is to search the Knowledge Base for answers or to post more complex questions to the Renesas Rulz forum, discussing it with other Synergy developers. On the support page, you can also access documentation, the Synergy Academy or the training videos on the official Synergy Platform channel on YouTube.

For getting going with the Renesas Synergy Platform, only two software packages are necessary: The Eclipse-based e<sup>2</sup> studio Integrated Solutions Development Environment (ISDE) and the Renesas Synergy Software Package (SSP). There are other packages available, like TraceX® from Express Logic or the IAR Embedded Workbench® for Renesas Synergy™, but they are not essential right at the beginning. There are no upfront costs associated with all the tools on the Solutions Gallery.

## 4.2 Downloading and Installing e<sup>2</sup> studio and the Synergy Software Package

e<sup>2</sup> studio contains all the tools necessary to create, compile and debug projects for the Synergy Platform. It is called Integrated Solutions Development Environment (ISDE), as additional solution-oriented components and plug-ins have been added, making it more powerful. This is especially true for the configurators, which allow an easy graphical access to the different hardware features like the clock module or the pin configuration without the need for deep study of the user's guide. These configurators will create all the necessary settings and the initialization code automatically, and they include an error-checking feature to detect problematic settings already at design time, saving tons of hours otherwise spent for writing and/or debugging code not adding value to the application itself. At least, I would have been more than happy if such tool had been available when I first started writing software for embedded processors. It's so much easier with the Synergy Platform!

The next paragraphs will walk you through the different steps of downloading and installing e<sup>2</sup> studio and the SSP on your Windows® workstation. You have two choices: You can either use the Platform Installer, which installs both e<sup>2</sup> studio and SSP in a single step or use the Standalone Installer for each individual package. It is up to you, and it does not really matter how you decide. The results will be the same.

### 4.2.1 Download of e<sup>2</sup> studio and the SSP

The first step is to download the installation packages. On the Synergy Solutions Gallery, make sure that you have logged into *My Renesas* and scroll down to *Software Tools* and click on the e<sup>2</sup> studio entry. The page for the ISDE will show. Scroll down to the *Download* section of the page and click either on *Download Platform Installer* or on *Download Standalone Installer* at the right-hand side of the current public release. When the license agreement for one of the installers pops up, read and accept the agreement by clicking on the *I Accept* button and the download of the zipped installer will start. While either the Platform Installer or the installer for e<sup>2</sup> studio is downloading, take some time to review the documentation available at the bottom of the page. Here you can access the release notes for the latest revision of e<sup>2</sup> studio and the HTML-version of the SSP User Manual.

Downloading the SSP follows the same basic steps, but remember, you only need to do that if you previously chose to select the Standalone Installer. To initiate the download, go to the main page of the Synergy Solutions Gallery and scroll down to *Software*. Click on the *Synergy Software Package* entry. The SSP-page will show. Again, scroll down to *Gallery Download* and select *Download Standalone Installer* at the right-hand side of the current release. As you already downloaded the standalone installer for e<sup>2</sup> studio, there is no need to go for the platform installer. Unless you changed your mind, of course. As with the previous download accept the license agreement and you are all set. At the bottom of the page, additional documentation for the SSP is available: The User's Manual as PDF- or HTML-version, the Software Datasheet, release notes and X-Ware™ documents, as well as a link to the applications projects available.

If you just want to be up and running as soon as possible, there is no need to create a license at this stage. The SSP comes completely with an evaluation license, which has some restrictions on viewing protected source code, but provides the full functionality of the tools otherwise.

## 4.2.2 Installing the Tools Using the Platform Installer

Once the download of the Platform Installer is complete, you should have a file called `setup_sspv1_7_0_e2s_v7_5_1.zip` in your download-folder. The name may vary depending on the revisions of the tools. It is a fairly big file, with a size of more than 1.3 GB

To start the installation, the downloaded archive needs to be decompressed first. This will create a file named `setup_sspv1_7_0_e2s_v7_5_1.exe`. Double-click on it to start the setup. If you are running Windows 10, and depending on the security settings of your workstation, installation might stop with a warning from the operating system that “Windows protected your PC”. In this case, click on *More info* and on *Run anyway*, and the installation will proceed. Windows® 7 and 8 may produce a similar warning. Just click *Yes* to continue. You can also safely answer *Yes* to the question “Do you want to allow this app to make changes to your device?” in the *User Account Control* dialog box appearing.

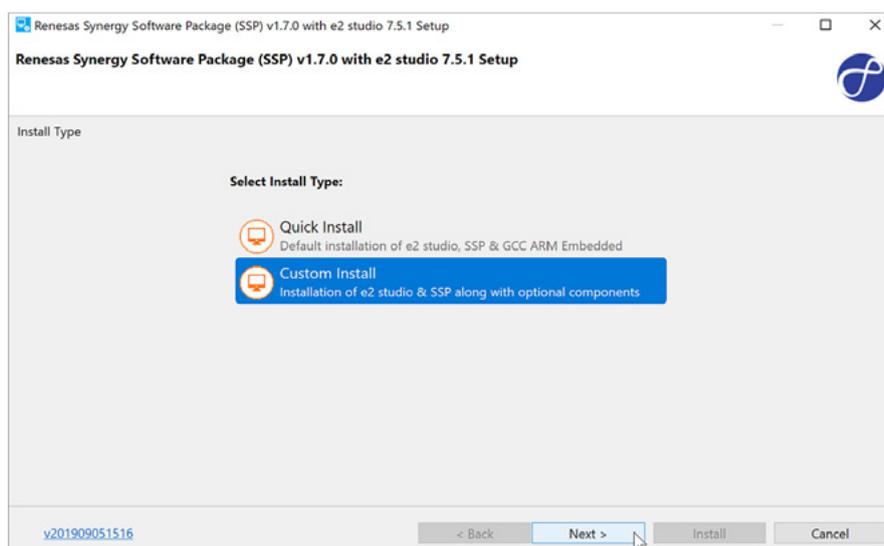


Figure 4-1: The custom installation is the way to go, as we want to install TraceX as well

Dismiss the first dialog box, asking if you want to *Install, modify or remove* the tools, by clicking on *Yes*. The installer will ask you for the install type (see Figure 4-1). There are two options: *Quick Install*, which simply installs e<sup>2</sup> studio and the SSP with their default settings and runs without any user interaction, or *Custom Install*, which allows not only to install the ISDE and the Synergy Software Package, but also TraceX® and GUIX™ Studio as optional components. The quick installation is the way to go, if you want to get going as fast as possible. But, as we will use TraceX® in chapter 11, the custom installation is more useful for our purpose. No matter how you decide now, things can be changed any time later on by either re-running the Platform Installer or by calling the respective Standalone-Installer(s).

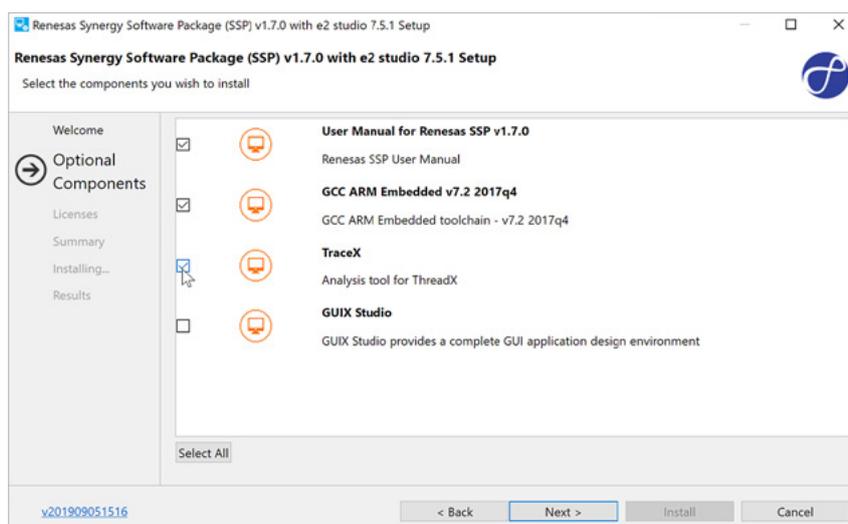


Figure 4-2: Add TraceX to the selection as well

So, select *Custom Install* and click on *Next*. The installation routine will check that the install directory is ready and that all components are available. Dismiss the result-screen by clicking on *Next*. Once the *Optional Component* dialog shows, select TraceX® (compare Figure 4-2) and click again on *Next*. The screen showing will present you the various software agreements for the components to be installed. Check the box with *I accept the terms of the Software Agreements* and click on *Next* on this screen and *Install* on the summary-screen following. The installation will start.

The next window appearing is the installation dialog for TraceX® (see Figure 4-3). For more information on the installation process, you might want to refer to chapter 11.3, but for now, the default values will do it. The Platform Installer will present you a last screen called *Results*. On this screen, just deselect *Run e<sup>2</sup> studio?* and *View Renesas SSP User Manual?* and click on *OK*. This completes the installation and you are ready for a first test of the development environment.

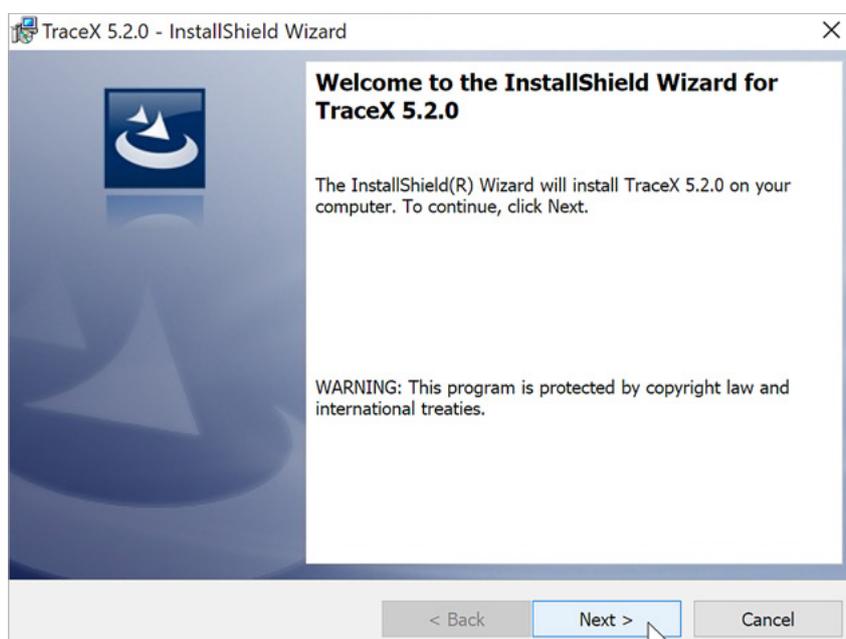


Figure 4-3: The installer for TraceX will start in a separate window. Just accept the defaults

### 4.2.3 Installing the Tools Using the Standalone Installers

If you decided to use the standalone installers, there should be two files in your download-folder by now: One is called `setup_e2_studio_7_5_1_R20190813.zip` (the revision number may vary) containing the installer for e<sup>2</sup> studio and the other one is called `SSP_Distribution_1.7.0.zip` (again, the revision number may vary) containing the installer for the SSP.

The installation-sequence is important: The e<sup>2</sup> studio ISDE needs to be installed first to allow correct integration of the SSP later on. To start the ISDE-installation, the downloaded archive needs to be decompressed first. This will create a file named `setup_e2_studio_7_5_1_R20190813.exe`. Double-click on it to start the setup. If you are running Windows 10, and depending on the security settings of your workstation, installation might stop with a warning from the operating system that “Windows protected your PC”. In this case, click on *More info* and on *Run anyway*, and it will proceed. Windows® 7 and 8 may produce a similar warning, just click *Yes* and the installation will proceed.

Follow the dialogs of the installer. If your workstation is behind a proxy, you may want to configure it at the *Welcome*-screen (lower right link) to ensure that the installation will work as expected. Click on *Next* and provide the installation path. Use the default or change it to suit your needs, but remember your selection. Later on you will need to install the SSP into the same folder. On the next screen, the device families can be chosen. Make sure to select Renesas Synergy™.



Figure 4-4: Make sure to select the support for Synergy devices

Click on *Next* and you will be presented with a couple of choices for extra components to be installed (see Figure 4-5). Make your choice. While most options are not particularly useful for Renesas Synergy, you might want to install the support for SVN and GIT. If you do not know yet, don't worry: You can re-run the installer any time later to add or remove features without having to go through the complete installation process again, or add the components directly from inside e<sup>2</sup> studio.

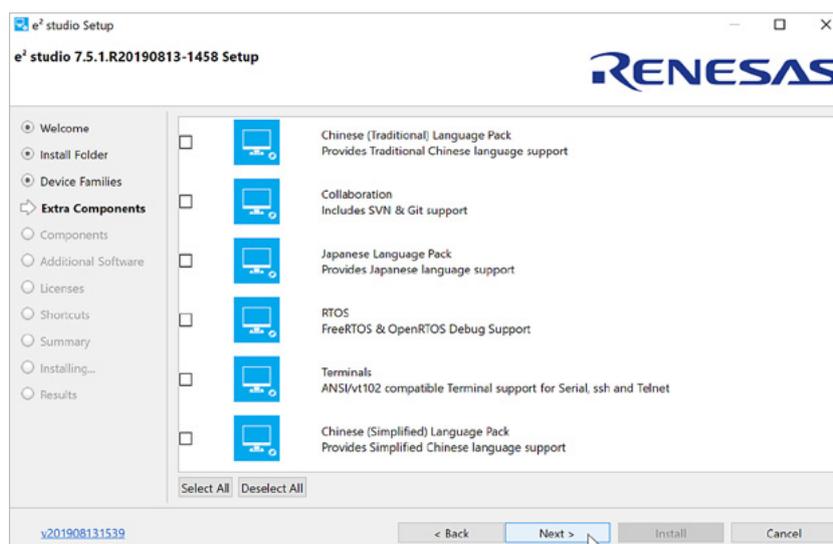


Figure 4-5: Nothing here is essential at the beginning and can be added later

On the following components screen (see Figure 4-6), having everything selected is the way to go. Especially take care not to deselect any of the *Debug* components. If you do so, you will not be able to create a debug configuration and to connect to a target board.

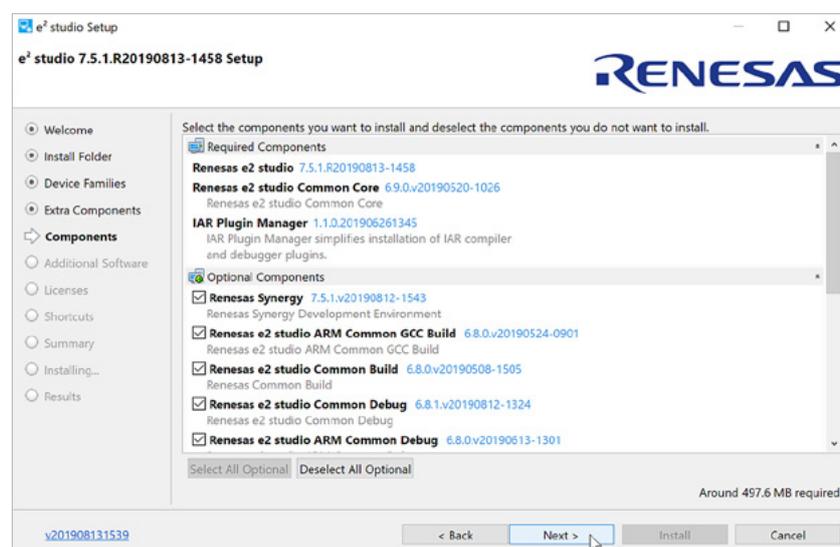


Figure 4-6: You should leave everything selected on this screen

The next screen will allow you to select additional software and the compiler (see Figure 4-7). Check the box beside *GCC ARM® Embedded 7.2 2017q4* (or later revision) to install the code generation tools. Accept the terms of the Software Agreements on the next screen. Click on *Install* twice and the installation will start. Be patient, it will take some minutes. Allow the installation of the device drivers from Renesas once prompted.

Later in the process, the installation of the GCC toolchain will start automatically. Follow the directions of the installer and wait for the installation to complete. When asked for the installation path it is highly recommended to leave it at the default, or to write down the exact location. The automatic toolchain integration will only work if it was installed at the default location. If you altered the path, you have to manually integrate it later on.

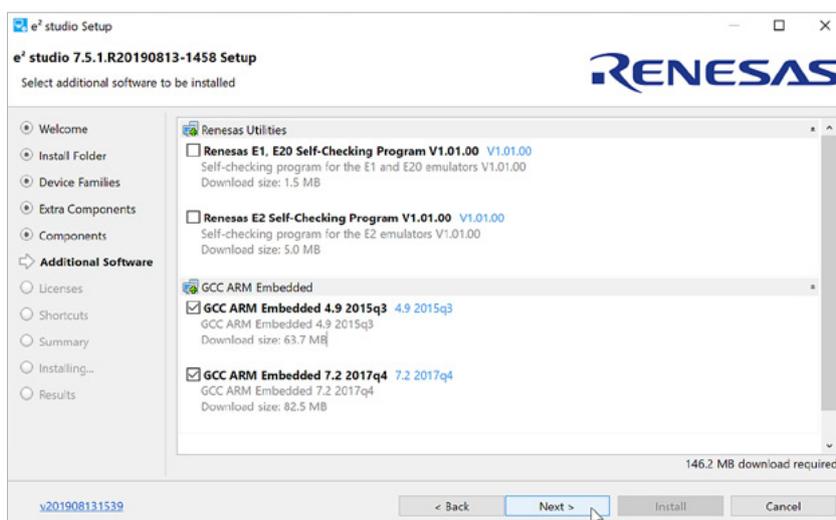


Figure 4-7: It's best to always select the latest compiler version

There will be a last screen, asking for some final steps. Check *Add path to environment variable*, as shown in Figure 4-8. This will add the path of the toolchain to the Windows environment and is necessary to insure an easy registration of the toolchain with e<sup>2</sup> studio. At this point there is no need to run *gccvar.bat*, so you can uncheck this box. Click on *Finish* and later also close the installer of the e<sup>2</sup> studio, once finished.

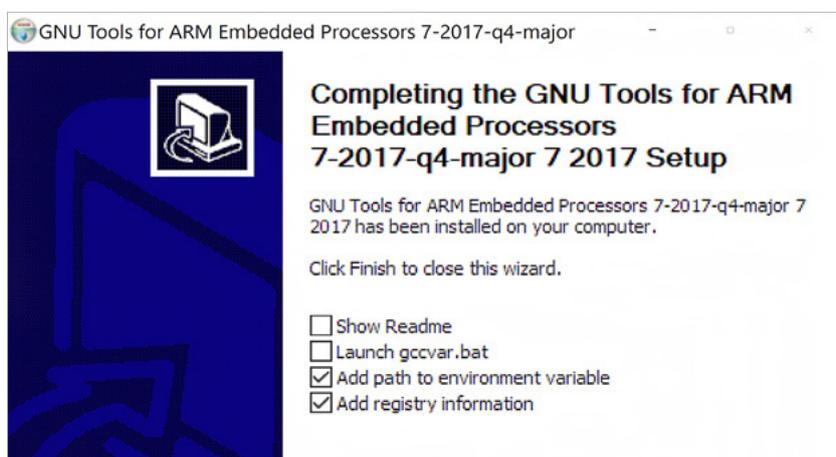


Figure 4-8: It is important to add the path to the environment variable

The next step is to install the SSP. For that, locate the downloaded zip file *SSP Distribution\_1.7.0.zip* and extract and run *SSP\_Distribution\_1.7.0.exe*. Follow the directions of the installer until you reach the *Choose Components* screen. Make sure that the *SSP\_Release\_Pack* and the *SSP\_Documentation* are selected. On the next screen check the path to confirm that you install the SSP in the root folder of the previously made e<sup>2</sup> studio installation. The ISDE was installed to *C:\Renesas\e2\_studio* by default. If you changed that during the setup of the e<sup>2</sup> studio, you have to enter the correct path here. Click on *Install* and the installation will start. During the process, you will be asked where to install the documentation. Accept the default, which points to *C:\Renesas\Synergy* or enter your own path. This will install the following documents: The HTML-version of the SSP User's Manual, a readme-file detailing last-minute updates and a PDF-file with SSP developer examples.

Once this installation has finished click on *Close* on the *Success* screen. You are all set and it is time to start the ISDE for the first time.

## 4.2.4 Starting for the First Time

Start e<sup>2</sup> studio from the *Start Menu* of the PC. It will ask you for a location for the workspace. You can accept the default or choose your own. As this is the first time you start the ISDE, it will extract and refresh additional support files and will restart itself afterwards. During the startup process, you should see a window called *Toolchain Integration*, as long as you installed the GCC toolchain at the default location. Make sure to select the version 7.2.1.20170904 (or higher) of the *GCC ARM® Embedded* toolchain you installed before and click on *Register*. Failing to do so will prohibit compilation of your projects later on and you will have to manually register the tools from inside the ISDE.

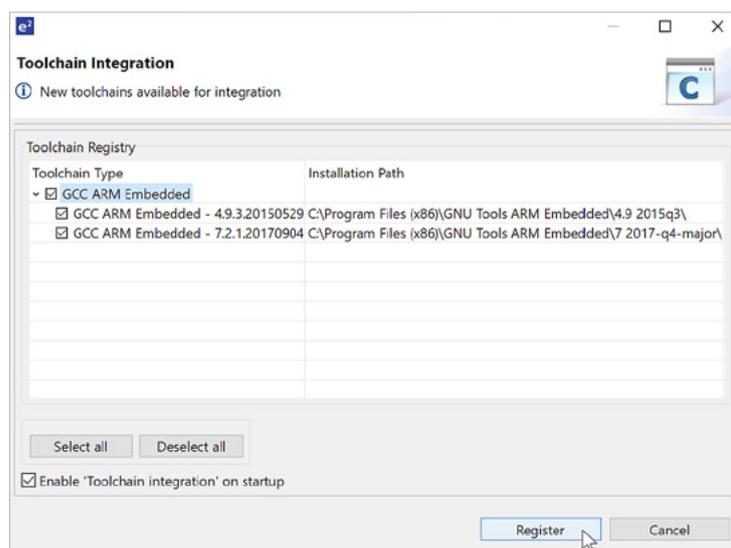


Figure 4-9: Failing to select the installed tool chain here will result in build problems

Once you are at the Welcome screen dismiss it by clicking on the *Workbench* icon at the upper right-hand corner of the screen. Next step is to create a first simple project to ensure that everything is working. For that, go to *File* → *New* → *Synergy C/C++ Project* on the menu bar, which will bring up a new window called *Templates for New Synergy C/C++ Project*. Select *Renesas Synergy C Executable Project* and click on *Next*. This will start the project configurator. Enter a name for this project, for example “*MySynergyProject*” and select the *GCC ARM® Embedded* toolchain at the right hand side. The next step is to point the e<sup>2</sup> studio to a valid license file, if it is not automatically listed. During the installation of the SSP an evaluation license was placed in the following folder `<e2 studio installation path>\internal\projectgen\arm\Licenses`. If you chose the Platform Installer, the `<e2 studio installation path>` will be `C:\Renesas\Synergy\e2studio_v7.5.1_ssp_v1.7.0`, and if you opted for the Standalone Installer, it will be `C:\Renesas\e2_studio` and the file selector will get you straight to this location. Select the (only) file there, with the name `SSP_License_Example_EvalLicense_20180725.xml` (or similar). Once loaded it will show the license information, the supported components and the related permissions in the window below.

The evaluation license you just installed allows you to use all parts of the Synergy Tools. The only limitation is that viewing the source code for ThreadX®, X-Ware™ components, libraries, stacks, and Application Frameworks API code will be limited. If you want to view this code, you will need a development and production license, which can be requested from the Synergy Solutions Gallery.

Click on *Next* to get to the device and tools selection screen. Select a board. As we only want to test the development environment, simply select the *S5D9 PK* for this first test and set the corresponding device to *R7FS5D97E3A01CFC*, if not already listed. Have a look at the toolchain. It should read *GCC ARM Embedded* with the version *7.2.1.20170904* or later.

If you installed the GNU-tools but they are not listed here, you need to integrate them manually. To do this, leave the New Project Wizard and go to the *Help*-menu of e<sup>2</sup> studio and select the entry *Add Renesas Toolchains*. Please note that the *Scan* option only works for toolchains having been installed at their default location. If you haven't installed the GNU-tools at their default location, either enter the path to your custom folder in the entry field or browse to the location using the files browser.

Next step is to select a project template. A project template includes the correct device and board dependent Board Support Library (BSP) and, if chosen, ThreadX<sup>®</sup> support enabled (no matter which template is chosen, ThreadX<sup>®</sup> can be enabled in the *Threads* tab of the *Synergy Configurator*). In addition, some of the templates include complete example projects as well. For our test, it is sufficient just to use a basic package, so select *Blinky*. Click on *Finish*. The configurator will extract all necessary files and will ask you if you want to open the *Synergy Configuration* perspective. Answer *Open Perspective* and the perspective for the *Synergy Configuration* will show. In the configurator, you could configure the SSP and most of the on-chip hardware of the processor. For the template we used for this example, everything has already been set, so click on the small green arrow saying *Generate Project Content* at the upper right-hand corner of the window and the configurator will create the configuration files and add them to the project.

Finally click on the small "Hammer"-symbol near the left hand corner of the toolbar on top of the ISDE and the project will compile and link. Once it has finished, it should show a status of 0 errors, 0 warnings after completion.

Now everything is set up and working and you are ready to start your own project. But hold on for a moment and ponder for a few seconds what we just did. I would think that for setting up this enormous software environment for a complete family of microcontrollers, the process is very easy and straightforward. Remember, we installed a software package with over 200 man-years of development effort and a complete ISDE in less than 10 minutes. I consider this as a very effortless process!

And, if something went unexpectedly wrong during the installation, you know help is always available, even right out of e<sup>2</sup> studio: Go to *Help* → *Synergy Helpdesk* and you will be directed to the Synergy Support page on the Internet. Another possibility is to click on the *Support* icon on the *Summary* tab of the *Synergy Configuration* perspective. This will open the Synergy Support page inside your web browser.

#### 4.2.5 Keeping Your Installation Up-To-Date

Having installed the tools, you might want to keep them in good shape, which means you want to keep them up-to-date. Or you are so excited about all the possibilities the Eclipse-based ISDE offers, that you want to install additional software. Keeping the installation current is achieved by loading the latest installations from the Synergy Solutions Gallery. Using the *Check for Updates* feature inside e<sup>2</sup> studio is not recommended, as the updates there may not add anything useful for the Synergy Platform.

If you want to install additional software, go to *Help* → *Install New Software*. On the following screen, choose the *All Available Sites* to search all sites and you will be presented a list of software available for download. And, of course, another way to get updates is to go to your favorite website, the Synergy Solutions Gallery, where you can find updates and additional software as well. For updates to the SSP, the Synergy Solutions Gallery is the best place.

Now that we know that the installation is working, the next steps will be to check out a development kit and to write your very own code.

## 4.3 Downloading and Installing the IAR Embedded Workbench® for Renesas Synergy™

This part of the chapter deals with the IAR Embedded Workbench® for Renesas Synergy™ (IAR EW for Synergy), which is completely integrated with the Renesas Synergy™ Platform. To reach this level of integration, Renesas created the Synergy Standalone Configurator (SSC), an Eclipse-based RCP application, which is available to IAR EW for Synergy users as download from the Synergy Solutions Gallery. The SSC includes the Synergy Project Generator and is otherwise identical to the *Synergy Configurator* in e<sup>2</sup> studio.

The key features of the IAR EW for Synergy are:

- Integrated development environment with project management tools and editor.
- Highly optimizing C and C++ compiler and linker for Renesas Synergy™ devices.
- Integration support for Renesas Synergy Standalone Configurator (SSC).
- C-STAT and C-RUN code analysis tools included.
- Extensive HW target system support.
- Power debugging to visualize power consumption in correlation with source code.
- C-SPY® Debugger with JTAG/SWD support and support for RTOS-aware debugging on hardware.
- Support for ETM Trace.
- Comprehensive user and reference guides and context-sensitive help function.
- Compliant with ARM® Embedded Application Binary Interface (EABI) and ARM Cortex® Microcontroller.
- Software Interface Standard (CMSIS).
- First level support provided by Renesas through the standard Synergy support channels.

All these outstanding features are included with the purchase of just one Synergy MCU and customers using the Synergy Platform receive a head-start never seen in the industry before.

The next paragraphs will walk you through the different steps of downloading and installing IAR EW for Synergy, the SSC, and the Synergy Software Package (SSP) on your Windows® workstation. You have two choices: You can either use the *Platform Installer*, which combines the installers of IAR EW for Synergy, SSC and SSP in a single package, or use the *Standalone Installers* for each individual package. It is up to you and it does not really matter, how you decide. The results are identical.

### 4.3.1 Download of the Various Installers

The first step is to download the installation packages. On the Synergy Solutions Gallery, make sure that you are logged into *My Renesas* and scroll down to *Software Tools* and click on the entry for *IAR Embedded Workbench® for Renesas Synergy™*. The page for the tool will show. Scroll down to the *Download* section of the page and click either on *Download Platform Installer* or on *Download Standalone Installer* at the right-hand side of the current public release, which at the time of printing is 8.23.3. When the license agreement for one of the installers pops up, read and accept the agreement by clicking on the *I Accept* button and the download of the zipped installer will start. While either the Platform Installer or the installer for IAR EW for Synergy is downloading, take some time to review the documentation available at the bottom of the page. Here you can access the *Getting Started Guide* and the *Release Notes* for the latest revision of the ISDE.

You will need a separate license for IAR EW for Synergy from IAR Systems®. It can be acquired either by clicking the link

provided for this purpose under *Installation Instructions* on this page, or, if you decided to use the Platform Installer, at the end of the installation process. Both ways will get you to a page on IAR Systems web site. All you need is to enter your email address and to click on *Get license*. An email with the license number and the instructions on how to activate it will be sent to your address. Retain this mail for further reference, as you will need it for additional installations.

If you didn't decide to use the Platform Installer, the next step is to download the Synergy Standalone Configurator. Go back to the Solutions Gallery, scroll down to the *Software Tools* section and click on the entry named *Renesas Synergy Standalone Configurator (SSC)*, which gets you to the details page for the SSC. Scroll down to the *Download* section and click on the *Download* button on the right-hand side of the *Current Public Release*. Accept the license agreement and the download of the zipped installer will start. While waiting for the download to complete, check the installation instructions and the release note for last minute updates.

Downloading the SSP follows the same basic steps, but remember, you only need to do that if you had previously chosen to use the *Standalone Installer*. To initiate the download, go to the main page of the Synergy Solutions Gallery and scroll down to *Software*. Click on the *Synergy Software Package* entry. The SSP-page will show. Again, scroll down to *Gallery Downloads* and select *Download Standalone Installer* at the right-hand side of the latest release. As you already downloaded the standalone installer for IAR EW for Synergy, there is no need to go for the platform installer. Unless you changed your mind, of course. As with the previous downloads accept the license agreement and you are all set. At the bottom of the page, additional documentation for the SSP is available: The User's Manual as PDF- or HTML-version, the Software datasheet, release notes and X-Ware™ documents, as well as a link to the applications projects available.

If you just want to be up and running as soon as possible, there is no need to create a license at this stage. The SSP comes complete with an evaluation license, which has some restrictions on viewing protected source code, but provides the full functionality otherwise.

### 4.3.2 Installing the Toolchain Using the Platform Installer

Once the download of the Platform Installer is complete, you will have a file called *setup\_sspv1\_7\_0\_iarew\_8\_23\_3.zip* with a size of approximately 1 GB in your download-folder. The revision numbers may vary depending on the versions of the tools.

To start the installation, the downloaded zip archive needs to be decompressed first. This will create a file named *setup\_sspv1\_7\_0\_iarew\_8\_23\_3.exe*. Double-click on it to start the setup program. If you are running Windows 10, depending on the security settings of your workstation, installation might stop with a warning from the operating system that "*Windows protected your PC*". In this case, click on "*More info*" and on "*Run anyway*", and the installation will proceed. Windows 7 and 8 may produce a similar warning. Just click *Yes* to continue. You can also safely answer *Yes* to the question "*Do you want to allow this app to make changes to your device?*" in the *User Account Control* dialog box appearing.

Dismiss the first dialog box of the installer, asking if you want to "*Install, modify or remove*" the tools by clicking on *Yes*. The installer will ask you for the install type (similar to Figure 4-1). There are two options: *Quick Install*, which simply installs the SSC and the SSP with their default settings and calls the installer for IAR EW for Synergy at the end, or *Custom Install*, which allows not only to install the ISDE, the Synergy Standalone Configurator and the Synergy Software Package, but also TraceX® and GUIX™ Studio as optional components. The quick installation is the way to go, if you want to get going as fast as possible. But, as we will use TraceX® in chapter 11, the custom installation is more useful for our purpose. No matter how you decide now, things can be changed at any time later on by either re-running the Platform Installer or by calling the respective Standalone Installer(s).

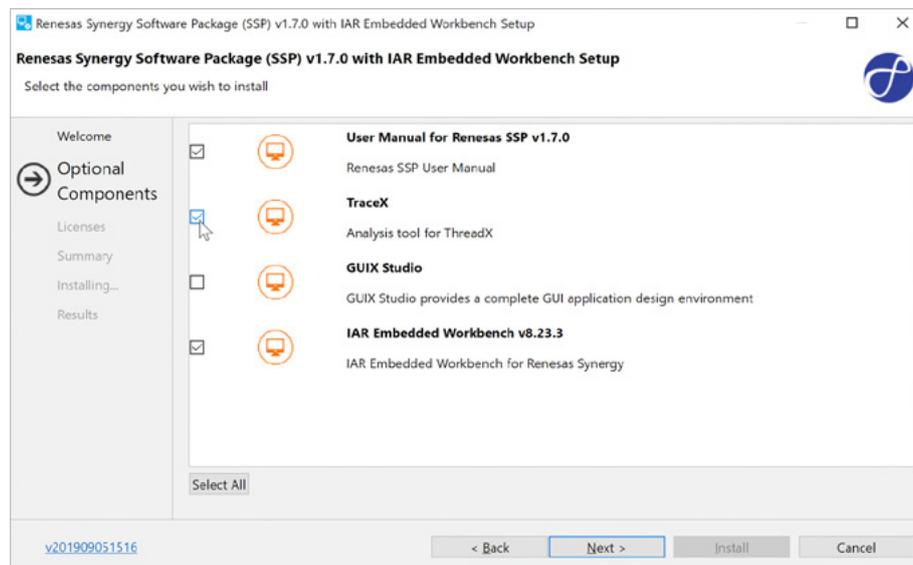


Figure 4-10: Add TraceX to the selection as well

For our purpose, select *Custom Install* and click on *Next*. The installation routine will check that the install directory is ready and that all components are available. Dismiss the result-screen by clicking on *Next*. Once the *Optional Component* dialog shows, select *TraceX*<sup>®</sup> (compare Figure 4-10) and click again on *Next*. The screen showing now will present you the various software agreements for the components to be installed. Check the box with “*I accept the terms of the Software Agreements*” and click on *Next* on this screen and *Install* on the summary-screen following. The installation will start.

The next window appearing is the installation dialog for *TraceX*<sup>®</sup> (see Figure 4-3). For more information on the installation process, you might want to refer to chapter 11.3, but for now, the default values will do it. Once the installation of *TraceX*<sup>®</sup> is complete, the installer for the IAR Embedded Workbench for Renesas Synergy will show. Follow the instructions, read and accept the license agreement and change or accept the destination folder for the installation. When asked which USB drivers should be installed, please keep the *J-Link* driver selected, as it will be needed for the next exercises, which will use the S5D9 Promotion Kit. But feel free to deselect the *I-jet* driver, if you do not plan to use an IAR Systems<sup>®</sup> debug probe (see Figure 4-13). Continue to follow the instructions of the IAR-installer until the installation starts. The process itself will take a while and when finished, unselect *View the release notes* and *Launch IAR Embedded Workbench* at the last screen.

The platform installer will present you a last dialog called *Results*. On this screen you can select to visit the Renesas Synergy Solutions Gallery after exiting the installer or to acquire a license for the IAR Embedded Workbench for Renesas Synergy if you haven’t already done that. When this entry is checked, it will call the registration page on the website of IAR Systems<sup>®</sup>. There you will only have to enter your email address and the license number will be mailed to you. Exit the installer by clicking on OK. This will complete the installation and you are ready for a first test of the development environment.

### 4.3.3 Installing the Toolchain Using the Standalone Installers

Once all downloads are completed, the installation process can start. There should be three files in the download folder by now: One is called *EWSYN-CD-8233-18530.zip* (the revision number may vary) containing the installer for the IAR EW for Synergy, one called *SSP\_Distribution\_1.7.0.zip* containing the installer for the Synergy Software Package and one called *SSC\_7.5.1.V20190813.zip* (again, the revision numbers might vary) containing the installer for the Synergy Standalone Configurator.

Please note that the installation-sequence is very important here, so please follow the instructions below closely. The first tool to be installed is the Renesas Synergy™ Standalone Configurator. For that, locate the downloaded zip file *SSC\_7.5.1.V20190813.zip* and extract and run *SSC\_7.5.1.V20190813.exe*. Follow the directions of the installer until you reach the *Choose Install Location* screen. Either accept the default path or choose your own. If you decide not to use the default location, make sure that you write down the full path. You will need it later on. Click on *Install* and the installation will complete.

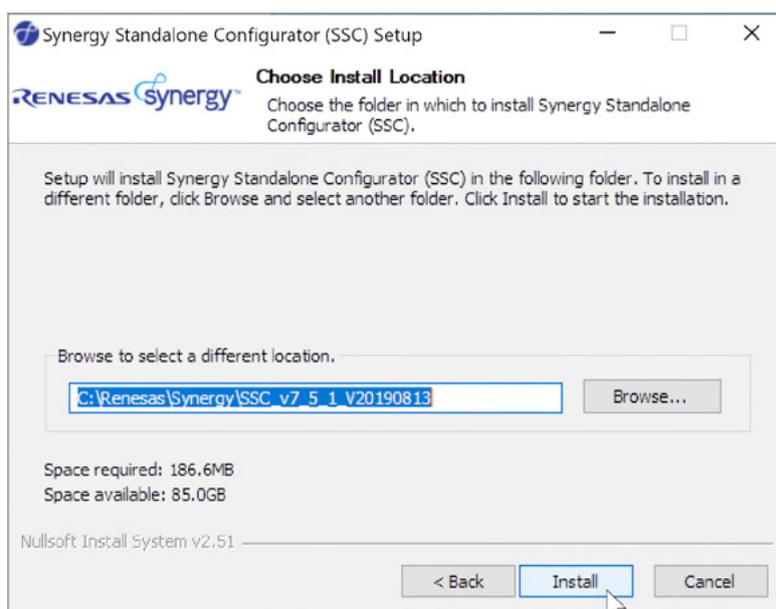


Figure 4-11: You can install the SSC either in the default location, or at any place you choose

Next, you will need to install the Synergy Software Package. Please note that you need to perform this step, even if you had previously installed the SSP together with e<sup>2</sup> studio. The SSC needs its own installation. To start the process, locate the downloaded zip file *SSP\_Distribution\_1.7.0.zip* and extract and run *SSP\_Distribution\_1.7.0.exe*.

Follow the directions of the installer until you reach the *Choose Components* screen. Make sure that the *SSP Release Pack* and the *SSP Documentation* are selected. On the next screen you will be prompted to specify an installation directory for the SSP. Just point the installer to the directory where you just installed the SSC. If you accepted the default location, this will be *C:\Renesas\Synergy\SSC\_v7\_5\_1\_V20190813* (or later), otherwise you will have to enter the correct path here.

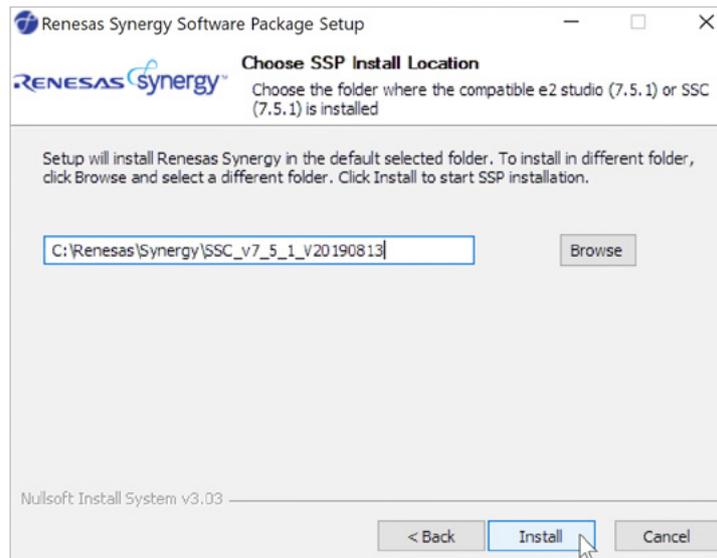


Figure 4-12: Make sure to specify the root folder of your SSC installation

Click on *Install* and the installation will start. During the process, you will be asked where to install the documentation. Accept the default, which points to *C:\Renesas\Synergy* or enter your own path. This will install a read-me file detailing last-minute updates and where to get the SSP User Manual on the web.

The final step is to install the IAR Embedded Workbench® for Renesas Synergy™. Locate the downloaded zip file *EWSYN-CD-8233-18530.zip*. Decompress the file and run the executable named *EWSYN-CD-8233-18530.exe*. On the selection screen appearing, click on *Install IAR Embedded Workbench® for Renesas Synergy*, which will start the installation process.

Follow the instructions of the setup-routine and read and accept the license agreement. Change or accept the destination folder for the installation. When asked which USB drivers should be installed, please keep the *J-Link* driver selected, as it will be needed for the next exercises, which will use the S5D9 Promotion Kit. But you can deselect the *I-jet* drivers, if you do not plan to use an IAR Systems® debug probe (see Figure 4-13).

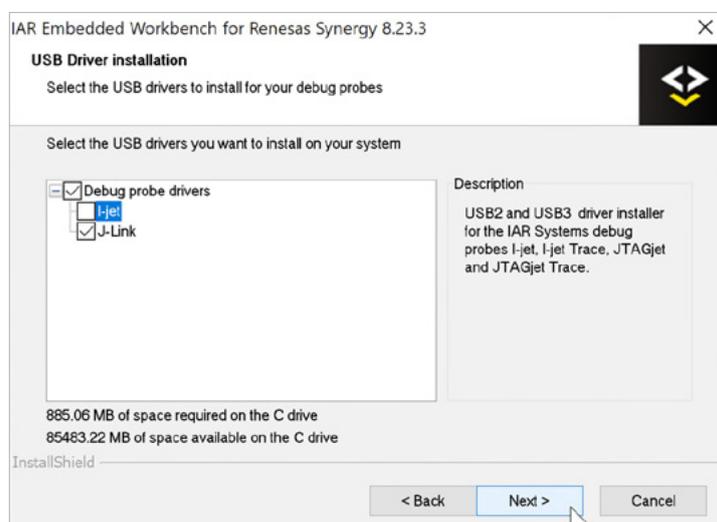


Figure 4-13: Make sure that the J-Link driver is selected for installation, as it is needed later on

Continue to follow the instructions of the installer until the installation starts. The process itself will take a while and when finished, deselect *View the release notes* and *Launch IAR Embedded Workbench* at the last screen. Click on *Finish* and the installation of the device drivers will start. Once this installation has finished as well, close the main installer by clicking on *Exit*.

With that, the installation of the IAR Embedded Workbench® for Renesas Synergy and the related tools is complete and it is time now to start the development environment for the first time.

#### 4.3.4 Starting for the First Time

Start the IAR EW for Synergy from the *Start Menu* of your Windows® workstation. It will first prompt you for the language to be used for the workbench. Make your choice and click *OK*. Then the license wizard will start. Enter the license number you received by email when registering at the download page in the Synergy Gallery. Click on *Next*.

The license wizard will activate your license and a final screen will tell you that “A temporary license has been activated”. Don’t worry! Your license will be extended well in time before it will expire. It is valid for an unlimited period of time and has no per-customer limit. When prompted to extract the *IAR Library Source for ARM*, select *Yes* and the library extractor will start. Once it has finished, the setup process is complete.

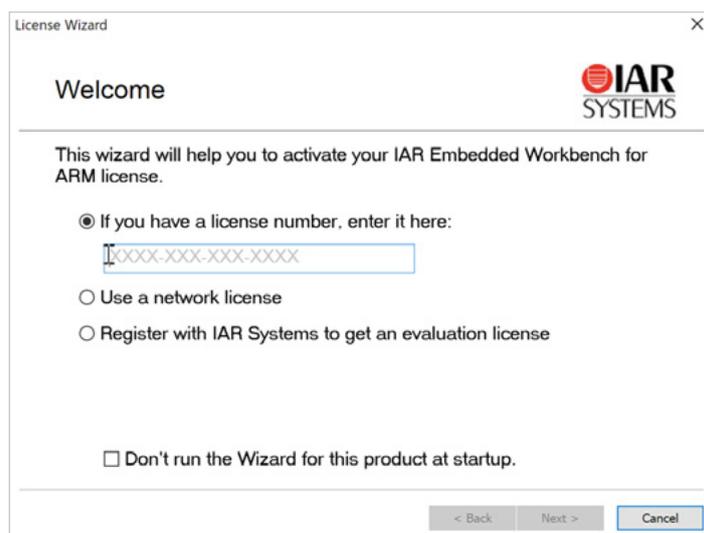


Figure 4-14: Enter the registration number you received by email

Your next step is to create a first simple project to ensure that everything is working. There are several ways to get this done, but the simplest one is to go to *Renesas Synergy* → *New Synergy Project*.

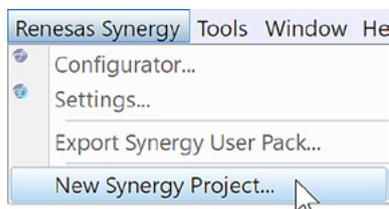


Figure 4-15: Select Renesas Synergy Project to create a new project

The dialog appearing will ask you for a suitable destination directory for your workspace. A workspace is the container holding your projects and you can name it as you like, for example *MySynergyWorkspace*. Select a location that suits your needs best. Click on *Save*.

Once the workspace is created, the window showing will ask you to specify the location of your installed Synergy Standalone Configurator, which by default was either *C:\Renesas\Synergy\SSC\_v7\_5\_1\_ssp\_v1.7.0*, if you used the Platform Installer, or *C:\Renesas\Synergy\SSC\_v7\_5\_1\_v20190813*, if you decided to go for the Standalone Installer, and the location and the name for the Synergy license file. You can find the later one in the *\internal\projectgen\Licenses* subdirectory of one of the installation directories given above (see Figure 4-16). The last item in the dialog asks you whether or not you want to like to replace any encrypted source files with decrypted ones. As this option is only applicable, if your license is a Renesas Synergy development and production license, you can leave this item unchecked, Click on *OK*.

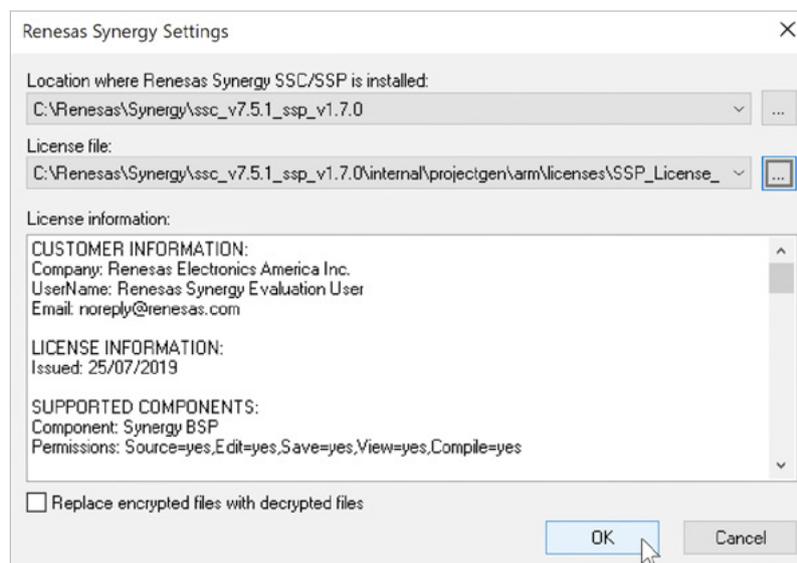


Figure 4-16: Enter the correct locations for the SSC and the license file

Another *Save As* dialog will appear. Enter a name for this project, for example *MySynergyProject*. Click on *Save*. The IAR EW for Synergy will now start the Synergy Standalone Configurator. On the first screen of the SSC, select the board support you require. As we only want to test drive the development environment, simply select the *S5D9 PK* for this first test and check if the corresponding device was set to *R7FS5D97E3A01CFC*. Select it from the list, if not. Click on *Next*.

Now it is time to select a project template. A project template includes the correct device and board dependent Board Support Package (BSP) and, if chosen, ThreadX® support enabled (no matter which template is chosen, ThreadX® can be enabled later on in the *Threads* tab of the *Synergy Standalone Configurator*). In addition, some of the templates include complete example projects as well. For our test, it is sufficient just to use a basic package, so select *Blinky*. Click on *Finish*. The SSC will extract all necessary files and will start the *Synergy Configurator*. In this configurator, you can configure the SSP and most of the on-chip hardware of the processor. For the template we selected for this example, everything has already been set, so click on the small green arrow saying *Generate Project Content* (see Figure 4-17) at the upper right-hand corner of the window and the configurator will create the configuration files and add them to the project.

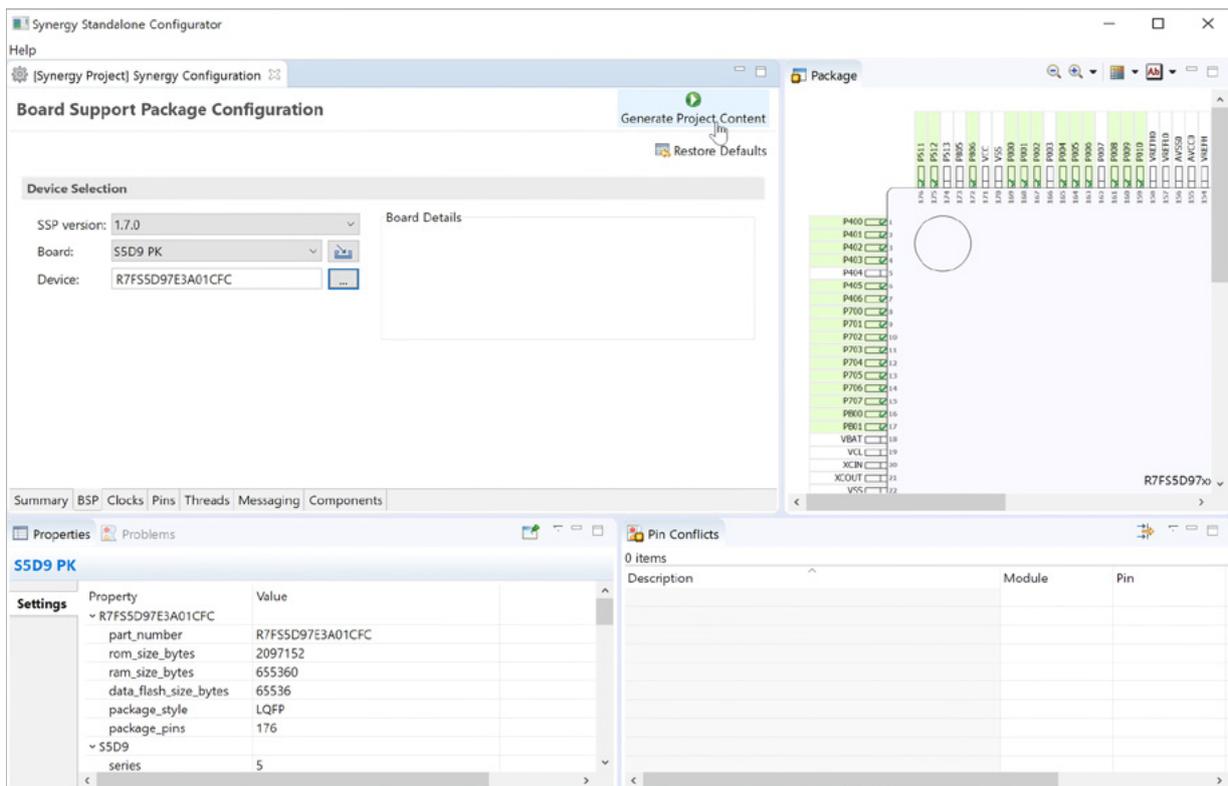


Figure 4-17: The Standalone Synergy Configurator lets you configure most aspects of your application

Close the SSC by clicking on the 'X' icon at the top right corner of the window. When looking at the *Workspace* viewer of the Embedded Workbench, you will notice that the configurator added the required files to your project. Note that you can go back to the SSC anytime by clicking on the *Synergy configuration* icon on the main toolbar, by selecting *Renesas Synergy* → *Configurator* in the main menu, or by right-clicking on the Synergy entry in the project tree and selecting *Open Renesas Synergy Configurator*.

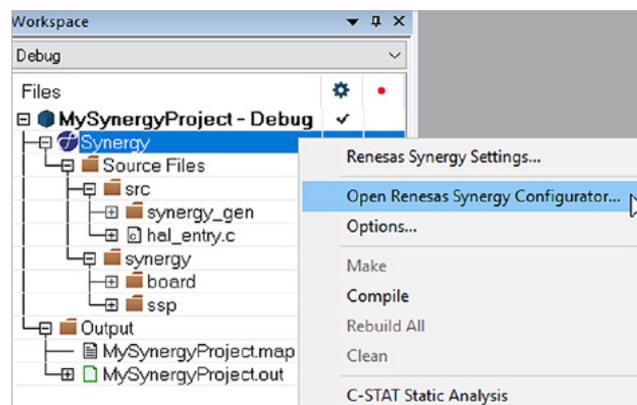


Figure 4-18: The SSC can be called any time later again

Finally click on the *Make* symbol in the toolbar or select *Project* → *Make* and the project will compile and link. Once it has finished, it should show a status of 0 errors, 0 warnings.

And, if something went unexpectedly wrong during the installation, you know that help is always available on the Synergy Support page on the web. This page can also be accessed directly by clicking on the *Support* icon on the Summary tab inside the SSC. This will open the Synergy Support page inside your web browser. Remember that Renesas is the first point of contact for everything belonging to the Synergy Platform, and this includes the IAR Embedded Workbench® for Renesas Synergy™ as well!

### 4.3.5 Keeping Your Installation Up-To-Date

Having installed the tools, you might want to keep them in good shape, which means you want to keep them up-to-date. The best way to get updates for the IAR EW for Synergy, the Synergy Software Package and the Synergy Standalone Configurator is to go to your favorite website, the Synergy Solutions Gallery, where you can find all the updates needed.

## 4.4 Installing the IAR Compiler into e<sup>2</sup>studio

You have also the possibility to use the compiler of IAR Systems® inside e<sup>2</sup>studio, making this world-class compiler available for your development inside this ISDE. For that you need to have both tools, e<sup>2</sup>studio and IAR EW for Synergy, installed. Inside e<sup>2</sup>studio, go to *Help* → *IAR Embedded Workbench plugin manager*. A list of available plugins will show. Select *Synergy 8.x* at the left pane, and check the box of the entry for *8.23.3* on the right side. The plugin manager will load additional components, which will take quite some time. A tiny progress bar at the bottom of the console area of e<sup>2</sup>studio shows the progress. This can be expanded if desired for more detail. Wait till it completes. Once the next dialog shows, select all plugins and click on *Next* twice. Accept the license agreements and finally click on *Finish*. The installation will start. If a *Security Warnings* dialog shows, dismiss it by clicking on *Install Anyway* and allow the installation to complete. Restart e<sup>2</sup>studio when prompted. The next time you create a new project, the IAR compilers will show in the new project wizard and can be selected for your development.

More details on the installation process and how to migrate existing projects using the GCC toolchain can be found in an application note titled *Installing IAR Compiler into e<sup>2</sup>studio* available from the e<sup>2</sup>studio page on the Synergy Solutions Gallery.

## 4.5 Summary

Now that we know that the installation is working, the next steps will be to check out a development kit and to write your very own code. But hold on for a moment and ponder for a few seconds what we just did. I would think that for setting up this enormous software environment for a complete family of microcontrollers, the process is very easy and straightforward. Remember, we installed a software package with over 200 man-years of development effort and a complete development environment, be it e<sup>2</sup>studio or the IAR EW for Synergy in less than 10 minutes. I consider this as a very effortless process!

### Points to take away from this chapter:

- Installation is straightforward, but care should be taken to install in the right order.
- If you do not install the GCC tools to their default directory, you will have to register them manually inside the ISDE.
- IAR Embedded Workbench® for Renesas Synergy™ integrates the Synergy Standalone Configurator, bringing the complete functionality of the Renesas Synergy™ Platform to this development environment as well.

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